

Notice of Allowability

Application No.

10/632,583

Examiner

John B. Strege

Applicant(s)

OOTA, AKIHIRO

Art Unit

2624

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to the amendment filed 11/23/07.
2. ☒ The allowed claim(s) is/are 1-4, 9, 12, 15, 16, 20, 23 and 24.
3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☒ All b) ☐ Some* c) ☐ None of the:
 1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☒ Interview Summary (PTO-413),
Paper No./Mail Date 1/18/08.
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

EXAMINER'S AMENDMENT

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Josephine Chang on 1/18/08.

Please amend the claims as follows

1. (Currently amended) A pattern-matching processing method, comprising:

an area generating step for generating a left area and a right area each having a given range from a left image and a right image photographed in stereo;

a pixel interpolating step for generating an interpolation pixel between pixels of a plurality of pixels included respectively in the left area and the right area, wherein the pixel interpolating step includes performing a first pixel interpolation between two first adjacent pixels along a first direction in the left area and in the right area, and performing a second pixel interpolation between two second adjacent pixels along a second direction perpendicular to the first direction, wherein the second pixel interpolation includes calculating an average value of plural pixels surrounding [[the]] a position to be interpolated, wherein the plural pixels include both interpolated pixels and non-interpolated pixels, and wherein in calculating the average value, the already interpolated pixels among the plural pixels surrounding the position to be interpolated are assigned a weight of less than 1 less than the weight given to the non-interpolated pixels; and

a pattern matching step for performing pattern matching using the left area interpolated with the corresponding interpolation pixels and the right area interpolated with the corresponding interpolation pixels.

2. (Currently amended) A pattern-matching processing method, as set forth in claim 1, wherein said first and second pixel interpolations are performed on said left area and said right area containing ~~[[the]]~~ a number of pixels surrounding ~~[[the]]~~ a matching position specified by the pattern matching step based on an original left area and an original right area, ~~in said pixel interpolating step.~~

3. (Currently amended) A pattern-matching processing method, comprising:

an area generating step for generating a left area and a right area each having a given range from a left image and a right image photographed in stereo;

a pixel interpolating step for generating an interpolation pixel between pixels of a plurality of pixels included in either the left area or the right area, wherein the pixel interpolating step includes performing a first pixel interpolation between two first adjacent pixels along a first direction in the left area or in the right area, and performing a second pixel interpolation between two adjacent pixels along a second direction perpendicular to the first direction, wherein the second pixel interpolation includes calculating an average value of plural pixels surrounding ~~[[the]]~~ a position to be interpolated, wherein the plural pixels include both interpolated pixels and non-interpolated pixels, and wherein in calculating the average value, the ~~already~~ interpolated pixels among the plural pixels surrounding the position to be interpolated are assigned a weight of ~~less than 1~~ less than the weight given to the non-interpolated pixels; and

a pattern matching step for performing pattern matching using the area interpolated with the corresponding interpolation pixel and the area without interpolation pixels.

4. (Currently amended) A pattern-matching processing method, as set forth in claim 3, wherein said first and second interpolations are performed on said left area and said right area containing ~~[[the]]~~ a number of pixels surrounding ~~[[the]]~~ a matching position specified by the pattern matching step based on an original left area and an original right area, ~~in said pixel interpolating step.~~

5-8. (Cancelled)

9. (Currently amended) A pattern-matching processing method, as set forth in claim 1, wherein said second pixel interpolation is performed starting from ~~[[the]]~~ a pixel position at which ~~[[the]]~~ a number of the pixels surrounding the position to be interpolated is largest, ~~which is the target for which the average value is calculated, in said pixel interpolating step.~~

10-11. (Cancelled)

12. (Currently amended) An image processing apparatus measuring ~~[[the]]~~ a distance to an object that is photographed as images, by performing pattern-matching processing based on left and right images photographed by a stereo camera, comprising:

an area generating unit for generating a left area and a right area each having a fixed range from the left image;

a pixel interpolating unit for generating an interpolation pixel between pixels of a plurality of pixels included respectively in the left area and the right area, wherein the pixel interpolating step includes performing a first pixel interpolation between two first adjacent pixels along a first direction in the left area and in the right area, and performing a second pixel interpolation between two second adjacent pixels along a second direction perpendicular to the first direction, wherein the second pixel

interpolation includes calculating an average value of plural pixels surrounding [[the]] a position to be interpolated, wherein the plural pixels include both interpolated pixels and non-interpolated pixels, and wherein in calculating the average value, the already interpolated pixels among the plural pixels surrounding the position to be interpolated are assigned a weight less than the weight given to the non-interpolated pixels of less than 1; and

a pattern-matching processing unit having a pattern-matching unit performing pattern matching based on the left area interpolated with the corresponding interpolation pixels and the right area interpolated with the corresponding interpolation pixels, or based on one of the areas without pixel interpolation and the other area interpolated with the corresponding interpolation pixels.

13-14. (Cancelled)

15. (Currently amended) An image processing apparatus, as set forth in claim 12, wherein said pixel interpolating unit performs pixel interpolation on the left area and the right area containing [[the]] a number of pixels surrounding [[the]] a matching position specified by the pattern matching step based on an original left area and an original right area.

16. (Currently amended) An image processing apparatus, as set forth in claim 12, wherein said pixel interpolating unit performs pixel interpolation on the right area containing [[the]] a number of pixels surrounding [[the]] a matching position specified by the pattern matching step based on an original left area and an original right area.

17-19. (Cancelled)

20. (Currently amended) An image processing apparatus, as set forth in claim 12, wherein said pixel interpolating unit performs pixel interpolation starting from ~~[[the]]~~ a pixel position at which ~~[[the]]~~ a number of the pixels surrounding the position to be interpolated is largest, ~~which is the target~~ for which the average value is calculated.

21-22. (Cancelled)

23. (Currently Amended) A pattern-matching processing method, as set of forth in claim 3 or 4, wherein said second pixel interpolation is performed starting from ~~[[the]]~~ a pixel position at which ~~[[the]]~~ a number of the pixels surrounding ~~[[the]]~~ a position to be interpolated is largest, ~~which is the target~~ for which the average value is calculated, ~~in said pixel interpolating step.~~

24. (Currently Amended) An image processing apparatus measuring ~~[[the]]~~ a distance to an object that is photographed as images, by performing pattern-matching processing based on left and right images photographed by a stereo camera, comprising;

an area generating unit for generating a left area and a right area each having a fixed range from the left image;

a pixel interpolating unit for generating an interpolation pixel between pixels of a plurality of pixels included in respectively the left area and the right area, wherein the pixel interpolating step includes performing first pixel interpolation between two first adjacent pixels along a first direction in the left area and in the right area, and performing a second pixel interpolation between two second adjacent pixels along a second direction perpendicular to the first direction, wherein the second pixel interpolation includes calculating an average value of plural pixels surrounding ~~[[the]]~~ a position to be interpolated, wherein the plural pixels include both interpolated pixels and non-interpolated pixels, and wherein in calculating the average value, the already interpolated pixels among the plural pixels surrounding the position to be interpolated

are assigned a weight less than the weight given to the non-interpolated pixels of less than 1; and

a pattern-matching processing unit having a pattern-matching unit performing pattern matching based on the left area interpolated with the corresponding interpolation pixels and the right area interpolated with the corresponding interpolation pixels, or based on one of the areas without pixel interpolation and the other area interpolated with the corresponding interpolation pixels; and

a distance measuring unit for calculating the distance from the difference in positions of the left image and the right image based on ~~[[the]]~~ a matching position specified by performing pattern matching on the left area and the right area.

As discussed in the interview on the 18th of January, These amendments were made to distinguish the claims from the prior art of record.

Response to Amendment

The amendment received 11/23/07 was entered in full. The applicants arguments are moot since the Examiner discussed in a telephone interview the manner in which the claims could be made to overcome the prior art of record. As this was agreed upon the claims were amended in the manner seen above and the application is now in condition for allowance.

Allowable Subject Matter

Claims 1-4,9,12,15-16,20, and 23-24 are allowed.

The following is a statement of reasons for the indication of allowable subject matter: None of the prior art of record discloses in combination with the other limitations of the claims a pattern-matching processing method/apparatus wherein a pixel

interpolating step for generating an interpolation pixel between pixels of a plurality of pixels included respectively in the left area and the right area, wherein the pixel interpolating step includes performing a first pixel interpolation between two first adjacent pixels along a first direction in the left area and in the right area, and performing a second pixel interpolation between two second adjacent pixels along a second direction perpendicular to the first direction, wherein the second pixel interpolation includes calculating an average value of plural pixels surrounding [[the]] a position to be interpolated, wherein the plural pixels include both interpolated pixels and non-interpolated pixels, and wherein in calculating the average value, the interpolated pixels among the plural pixels surrounding the position to be interpolated are assigned a weight less than the weight given to the non-interpolated pixels. Thus the claims are allowable.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to John B. Strege whose telephone number is (571) 272-7457. The examiner can normally be reached on Monday-Friday between the hours of 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta can be reached on (571) 272-7453. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Application/Control Number:
10/632,583
Art Unit: 2624

Page 9

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